Supervising Adaptive Educational Games

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Recent years, the number of children with special needs have risen. Researches say that approximately 5 to 10 percent of the children have some kind of learning disability. They are not able to adapt the traditional teaching methods, and because of this, they cannot take part in the traditional education system. Their special needs and changed perception ability require highly qualified experts and special teaching methods. If they get this necessary treatment, they can reach as high results as their healthy mates. Researches say that children with special needs can communicate better, if digital devices are included to the communication. It is the same at their learning. The recent years educational pieces of software were developed for students with dyscalculia, dyslexia, dysgraphia or ADHD (Attention Deficit Hyperactivity Disorder). These tools are giving a great opportunity for individual practicing, which is very important for these children. Nevertheless, they have a problem. We cannot expect from a child to be able to set the proper task and difficulty for himself. These values have a huge effect on the learning efficiency. If they are chosen badly, the student quickly can get bored or frustrated and demotivated about the learning.

In this paper, we present our universal solution to this problem. In our system, which runs on mobile devices, there is a framework, which can measure the mental state of the student with the attached biofeedback devices. Based on these measurements, it is able to make recommendations to change the difficulty of the gameplay, or to give a reward to the player. With these changes, it can affect the mental state of the student, in order to keep him in the proper state. The framework contains an algorithm, which is responsible for the calculation of the mental state and the mental workload.

Our system makes it possible for the teacher to set up the training set manually, and make the machine learning process supervised. The framework contains a function, where the supervisor can send feedback to the system to train the classification algorithm. The teacher can make the recommendation based on her personal experience or the physiological data of the student, which is presented to her by the framework. Our system is designed not only for one student. It also helps the teacher to supervise a whole class efficiently. She is able to monitor and manipulate the gameplay of many students at the same time.